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(71) Applicant:

LEAR CORPORATION ITALIA S.p.A.  
10128 Torino (IT)

(72) Inventor: Bouhours, Daniel

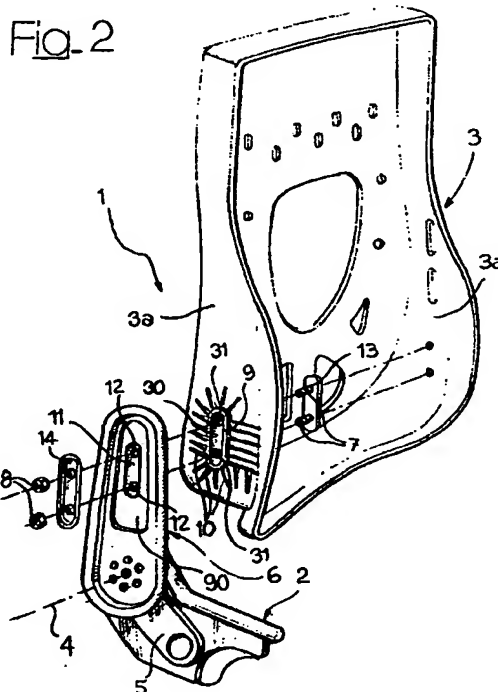
10095 Grugliasco (Torino) (IT)

(74) Representative:

Notaro, Giancarlo et al  
c/o Buzzzi, Notaro & Antonielli d'Oulx srl,  
Corso Fiume 6  
10133 Torino (IT)

(54) **Motor-vehicle seat frame**

(57) A motor-vehicle seat comprises a backrest frame (3) and a cushion frame (2) having sides to which there are secured steel plates (6) for articulated connection to the cushion frame (2) or the backrest frame (3) respectively. The magnesium frame (3) and the steel plate (6) have rounded mating contact surfaces (30, 60) and the magnesium frame has holes (31) for engagement of the securing screws (7), within which the screws (7) are arranged with clearance. The contact surface (30) on the magnesium frame (3) is defined by a cavity (30) surrounded by a projecting bead (9) from which strengthening ribs (10) extend radially.



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## Description

The present invention relates to motor-vehicle seats, of the type comprising a frame made of magnesium alloy and a steel plate secured by means of screws, rivets or the like to the magnesium frame. In the following description and claims, the term "screws" must be understood as including any other equivalent coupling means, such as rivets.

Seats of the above indicated type are becoming of increasing use in the automotive industry, where the need of reducing the weight of the whole structure of the motor-vehicle is more and more felt. Typically, the seats of the above indicated type comprise a cushion frame and a backrest frame, both made of magnesium alloy, having sides on which two pairs of steel plates are secured, these plates being pivotally connected to each other around an axis which is transverse relative to the longitudinal direction of the motor-vehicle, by means of a conventional backrest adjustment device.

Tests conducted by the Applicant on seats of the above indicated type have shown a tendency to formation of cracks and ruptures which spread starting from the surface of the holes formed in the frame of magnesium alloy which are engaged by the screws for securing the steel plate. Studies conducted by the Applicant have brought to find that these ruptures are due to that the loads transmitted between the steel plate and the frame of magnesium alloy are concentrated in limited areas and therefore subject the magnesium structure to an excessive stress.

In order to solve this drawback, the present invention provides a seat of the type indicated at the beginning, characterized in that the magnesium frame and the steel plate are in contact with each other only at an area where said screws are mounted, where they have rounded mating contact surfaces, the magnesium frame having holes for engagement of the screws within which the screws are arranged with clearance.

Due to this feature, and particularly due to the provision of rounded mating contact surfaces, the loads transmitted between the steel plate and the magnesium frame are distributed over a relatively wide surface. Furthermore, the fact that the screws engage the holes formed in the magnesium frame with clearance avoids that the screws apply a shear stress to the wall of said holes, thus nullifying the risk of ruptures. Therefore, the clamping of the steel plate onto the magnesium frame is only due to the friction caused by the pressure which is exchanged between the mating contact surfaces due to the strain of the screws, which are tightened by means of cooperating nuts.

Furthermore, the head of each screw and the cooperating nut are supported against the frame of magnesium alloy and the steel plate with the interposition of respective plates which further contribute to distribute the force generated by the screw strain on a wide surface.

The invention will be now described with reference to the annexed drawings, given purely by way of non limiting example, in which:

figure 1 is a partial perspective view of a frame of a seat according to the invention,  
figure 2 is an exploded perspective view of the detail of figure 1, and  
figure 3 is a cross-sectional view taken along line III-III of figure 2.

With reference to the drawings, numeral 1 generally designates the frame of a motor-vehicle seat, comprising a backrest frame 3 and a cushion frame (not shown, since it is similar to frame 3), both made of magnesium alloy. The frames are mutually articulated with each other around an axis 4 which is transverse relative to the longitudinal direction of the motor-vehicle (with reference to the mounted condition of the seat thereon) by means of a conventional device for adjustment of the backrest (not shown) which can be of any known type. The backrest adjustment device pivotally connects each of two pairs (only one of which is shown in the drawing) of steel plates 5, 6 which are respectively fixed to the sides of the cushion frame and the backrest frame 3.

In the present description, specific reference will be made to the connection of the two plates 6 to the two sides of the backrest frame 3, while it is clearly understood that this description may be equally adapted to the case of the connection of the two steel plates 5 to the two sides of the cushion frame.

With reference to figures 2, 3, each plate 6 is secured to the respective side wall 3a of the frame 3 made of magnesium alloy by means of a pair of screws 7 tightened by means of nuts 8. The plate 6 and the respective side wall 3a of frame 3 are in contact with each other substantially only at an area where screws 7 are applied, where they have rounded mating contact surfaces 30, 60. More precisely, the contact surface 30 of the magnesium frame 3 is formed by a vertically elongated cavity, with a semicircular profile, which is surrounded by a projecting bead 9 which is further strengthened by radial ribs 10 projecting from the outer surface of the side 3a of frame 3. On the bottom of cavity 30 there are formed two holes 31 for engagement of the two screws 7.

Similarly, the steel plate 6 has a flat area 90 which is supported against bead 9 of side 3a and has a pressed out portion 11 at its central area whose surface facing the side 3a defines the above mentioned contact surface 60 having a shape mating that of surface 30 of frame 3. At the pressed out portion 11 there are provided two holes 12 for passage of screws 7.

As clearly shown in figure 3, each screw 7 engages the respective hole 31 of frame 3, as well as the hole 12 of plate 6 with clearance. Furthermore, the head 7a of each screw 7 and the cooperating nut 8 are supported against frame 3 and plate 6 with the interposition of

plates 13, 14 which further contribute to distribute the force generated by the strain of screws 7 on a wide surface.

As already indicated in the foregoing, the provision of rounded mating contact surfaces 30, 60, the provision of clearance between the screws and the walls of holes 31, as well as the provision of strengthening ribs 10 in the magnesium frame prevent formation of cracks or ruptures in this frame due to the forces transmitted by the steel plate 6 at the areas where holes 31 tend to generate a notch effect.

Obviously, as indicated already above, the foregoing description may be also applied to the connection of steel plates 5 to the magnesium cushion frame.

Naturally, also, while the principle of the invention remains the same, the details of construction and the embodiments may widely vary with respect to what has been described and shown, without departing from the scope of the present invention.

#### Claims

1. Motor-vehicle seat, comprising a frame (3) made of magnesium alloy and a steel plate (6) secured to the magnesium frame (3) by means of screws (7), rivets or the like,  
characterized in that the magnesium frame (3) and the steel plate (6) are in contact with each other substantially only at an area where said screws (7) are applied, where they have rounded mating contact surfaces (30, 60), the magnesium frame having holes (31) for engagement of the screws (7), within which the screws (7) are arranged with clearance.
2. Seat according to claim 1, characterized in that said frame is the frame (3) of the backrest and said plate (6) is provided on a respective side thereof for articulated connection to a cushion frame (2).
3. Seat according to claim 1, characterized in that said frame is the cushion frame (2) and said plate (5) is provided on a respective side thereof for articulated connection to a backrest frame (3).
4. Seat according to claim 1, wherein each securing screw (7) is tightened by means of a cooperating nut (8), characterized in that the head (7a) of each screw (7) and the respective nut (8) are supported against said magnesium frame (3) and said steel plate (7) with the interposition of force distributing plates (13, 14).
5. Seat according to claim 1, characterized in that the contact surface provided on the magnesium frame (3) is defined by an elongated cavity (30) having a semi-circular profile, which is surrounded by a projecting bead (9) from which strengthening ribs (10)

extend radially, said projecting bead (9) and said ribs (10) being formed in one piece with the magnesium frame (3).

6. Seat according to claim 5, characterized in that the contact surface (60) of the steel plate (6) is defined by a pressed out portion (11) of said plate (6) having a shape mating that of said cavity (30) formed in the magnesium frame (3), said pressed out portion (11) being formed at the center of the flat area (9) of the steel plate (6) which is supported against said projecting bead (9) of the magnesium frame (3) which runs along the periphery of said cavity (30).



Fig. 2

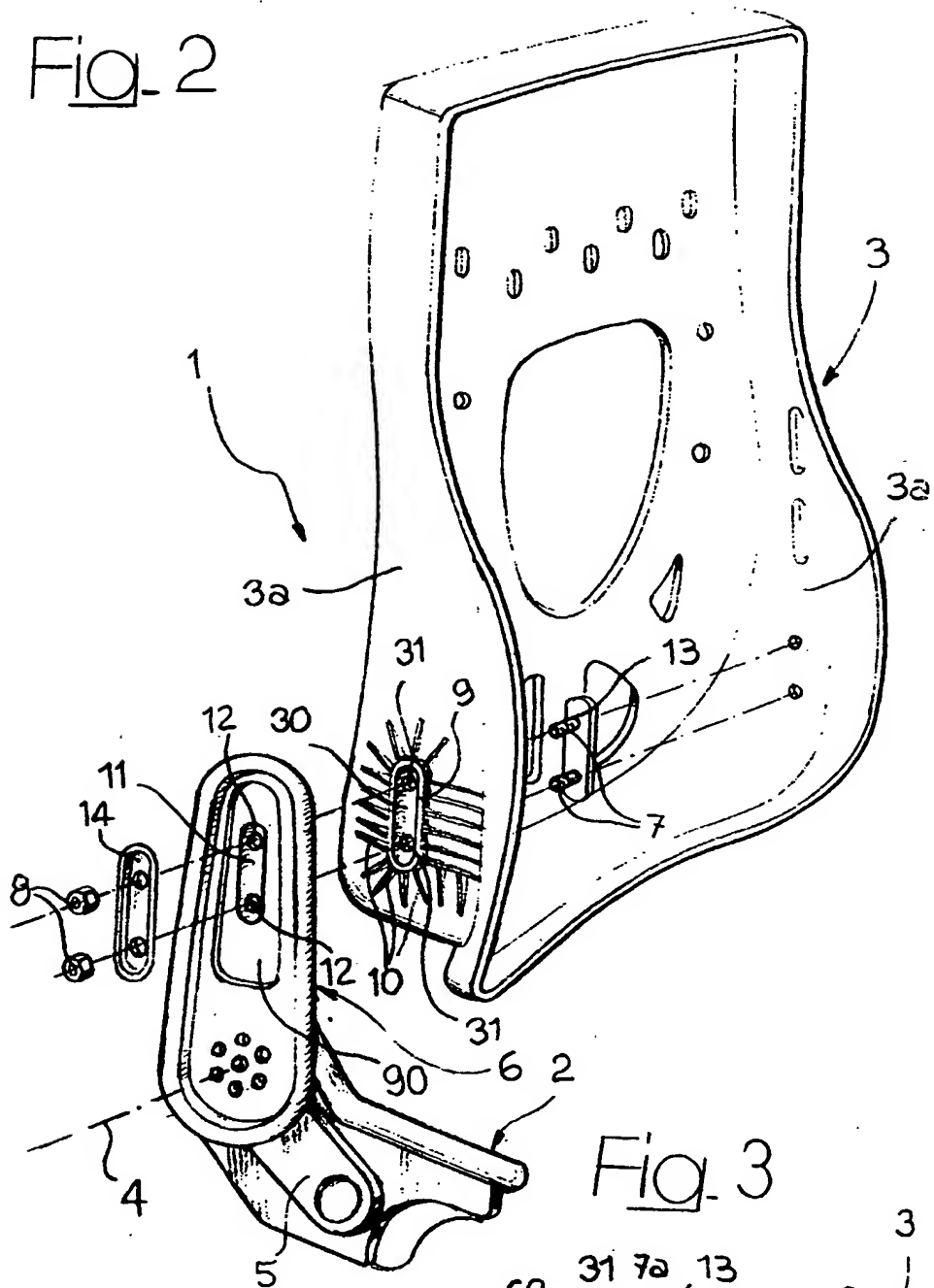


Fig. 3

